IN THE PATENT OFFICE OF THE UNITED STATES

--A SLOPE SETTING DEVICE FOR ITEMS OF FURNITURE--

[0001] The invention relates to a slope setting device for an item of furniture comprising a furniture part able to be set at a slant about a horizontal pivot axis, more particularly for worktables with a workboard able to be set at a slant, to bear the furniture part at the respective slant, a guide part having an elongated configuration and to be attached to the carcass of the furniture, a support part projecting from the guide part, said support part having an elongated configuration running telescopically in the guide part and serving for supporting the said furniture part able to be slanted, a brake means adapted to be ineffective or substantially so during withdrawal of the support part, and to brake movement of the support part during opposite insertion into the guide part and an actuating means to be actuated by the user for actuating the brake means.

[0002] Such a slope setting device is for example disclosed in the German patent application 102 29 617.0. The brake means renders possible a conveniently braked lowering of the furniture part, for example in the form of an obliquely set workboard. It is not necessary to hold the workboard with the hand during lowering. However the braking action of the brake means may vary in its effect, for example owing to having workboards with different weights or owing to objects resting on the workboard, and owing to manufacturing inaccuracies, for example in the case of the support part and/or the brake means or the like.

[0003] Accordingly it is one aim of the invention to design a slope setting device of the type initially mentioned with a braking action optimized for different applications.

[0004] This object is to be achieved in the case of a slope setting device of the type initially mentioned by making the braking acting of the brake means adjustable.

[0005] The braking action of the brake means, which is preferably a friction brake, can be adapted to the respective application so that for example the workboard may always be lowered at essentially the same rate. In the case of adjustment of the brake means it is possible, for example, to compensate for manufacturing inaccuracies in components of the slope setting device and/or for different weights of workboard or of other furniture parts.

[0006] Further advantageous developments of the invention are defined in the dependent claims and in the description.

[0007] The brake means comprises at least one brake body, on which the actuating means the acts on actuation thereof directly or indirectly so that so that it is thrust against the support part. The brake body or brake bodies form, as it were, brake jaws. Preferably two or more brake bodies are present arranged on opposite sides of the support part. The brake body or bodies are preferably bearinged in a recess, extending right through as far as the support part, of the guide part.

[0008] The brake body or bodies are preferably arranged on the side of the guide part. The actuating means has bridge or rib parts which extend to the side of the brake bodies past the guide part. Ramp face arrangements on the link parts act, on use of the actuating means, indirectly or directly on the brake body and thrust it against the support part. A

preferred design in accordance with the invention contemplates a indirect action, i. e. by way of roller bodies, and/or on the brake body or bodies. Instead of the roller bodies it is possible to provide balls or the like. This design is more especially advantageous in connection with an actuating means supported for linear motion.

[0009] The adjustment of the braking action may take place in different manners:

[00010] Preferably the distance between the rib parts and the guide part is adjustable.

[00011] It is an advantage for two rib parts, extending past the guide part, to be present, of which at least one acts on the at least one brake body. The rib parts for example constitute the arms of a fork or mutually opposite sections of a frame, which fit or, respectively, fits around the guide part with play permitting the actuating motion of the actuating means. To reset the braking action it is possible, for example, for the distance apart of the rib parts to be altered, for which purpose a screw or some other adjustment means is an advantage. The screw may for example connect the free ends of the two rib parts with one another.

[00012] For the adjustment of the action of the brake means it would be feasible as well for example for the angle of inclination of the ramp face device can be adjustable. For this purpose it is possible for instance to provide adjustment means acting on the side externally on the rib parts, as for example guide means for the rib parts on a housing of the slope setting device. This design is also for example possible when only one brake body and one rib part are present.

[00013] In the following one working embodiment of the invention will be described in detail with reference to the figures.

[00014] Figure 1 shows a worktable in accordance with the invention having an adjustable brake means and a slope setting device incorporating an actuating means in cross section.

[00015] Figure 2 is a perspective elevation in detail of an adjustable actuating element in the actuating means in accordance with figure 1.

[00016] Figure 3 shows the slope setting device according to figure 1 in a diagrammatic, partial oblique view, one of the halves of a device housing being omitted and the actuating means not being operated so that the support part is secured to prevent insertion into the guide part and the brake means not being operated.

[00017] Figure 4 shows the slope setting device in accordance with figure 1 but with the actuating means operated so that the support part may be pushed into the guide part while braked by the brake means.

[00018] Figure 5 is a cross sectional view of the slope setting device according to figure 3 taken on the line of section III - III of figure 3.

[00019] Figure 6 is a cross sectional view, corresponding to figure 5, of the slope setting device but with the actuating means operated.

[00020] In the case of a worktable 1 diagrammatically illustrated in figure 1, for example a desk intended for children or youngsters, and desk board or workboard 2 is able to be changed in inclination by moving from a horizontal initial position indicated in chained lines into one or more oblique positions, in which, as seen by the user, it slants

upward away from him. In figure 1 such an oblique setting of the workboard 2 is depicted in full lines. The workboard 2 is able to be pivoted about a pivot axis 3, which extends in a horizontal direction in the longitudinal direction of the table at the front side of the table adjacent to the user, and is accordingly able to be changed in inclination. Farther to the rear a slope setting device 4 engages the bottom side of the workboard 2 and holds the workboard 2 in the respectively set oblique position. In its horizontal starting position the workboard 2 may rest against an abutment 6 provided on the table carcass 5.

[00021] The slope setting device 4 possesses a guide part 7, which has an elongated configuration, and a telescoping support part 8, also having an elongated shape, which together constitute a telescopic arrangement. This telescopic arrangement is arranged standing up, it being able, as indicated, to be at slope. This telescopic arrangement has its guide part 7, for example a guide part end 9 opposite to the support part 8, attached to the table carcass 5 and by means of its support part 8, protruding at the top from the guide part 7, bears the workboard 2. A slide element 12, which is attached to the workboard 2 and is only diagrammatically indicated, is provided for a support part end 10, supporting the workboard 2, of the support part 8 and on such slide element 12 the support part 8 may be shifted in the depth direction 13 of the workboard 2, that is to say normally to the pivot axis 3.

[00022] The support part 8 runs on the guide part 7 while being prevented from turning. For instance a longitudinal recess 11 accommodating the support part 8 and receiving same, in the guide part 7 has a rectangular or square cross section. The lengths of the support part 8 and of the guide part 7 are

so selected that the support part 8 fits sufficiently far into the guide part 7 at the maximum angle of inclination of the workboard 2 for there to be a reliable connection. The maximum extension of the support part 8 from the guide part 7 may be limited by an abutment arrangement, not illustrated in the drawing.

[00023] On slanting the workboard 2 the support part 8 is drawn out of the guide part 7 or pushed into the guide part 7. To ensure that the support part 8 holds the workboard 2 in the longitudinal setting corresponding to the respectively desired slanting position of the workboard 2 a pawl clamp 14 is provided adapted to clamp the support part 8 and the guide part 7 together in the oblique position of the workboard 2. The manner of functioning of the pawl clamp part 14 will be described below in detail. On inwardly pushing in the support part 8 into the guide part 7 the pawl clamping effect occurs in any case automatically, whereas in the reverse direction the support part 8 entrains the pawl clamp part 14 so that accordingly the clamping effect is terminated.

[00024] By actuation of an actuating means 17 against a spring force exerted by a spring means 19 the user may tilt the workboard 2 downward. When the desired new inclination has been set he will release the actuating means. The spring means 19 then shifts the actuating means 17 into its inactive position, the pawl clamp part 14 and the support part 8 then automatically locking with a self-skewing action.

[00025] The lowering of the workboard 2 is braked by a brake means 27, which brake the motion of the support part 8. On operation of the actuating means 17 the support part 8 is released from the pawl clamp part 14 so that if the brake means 27 is not operated the workboard 2 must be held by hand during lowering. The brake means 27 remains inactive during

retraction of the support part 8 from the guide part 7 and during oppositely directed pushing in of the support part 8 into the guide part 7 takes effect. The actuating means 17 advantageously operates the brake means 27 simultaneously with the pawl clamp part 14 so that it comes into action.

[00026] The actuating means 17 comprises an actuating rod 20, on whose end portion, nearest to the brake means 27, an actuating element 21 is arranged, which is ineffective when the actuating rod 20 is not actuated and on actuation of the actuating rod 20 activates the brake means 27. The actuating rod 20 can be taken hold of by the user. In the working example the actuating rod 20 extends from near the brake means 27 underneath the workboard 2 to the front side, facing the user, of the table 2. The actuating rod 20 is preferably guided for linear motion, i. e. in its longitudinal direction so that the user must shift it in the longitudinal direction.

[00027] The linear guidance for the actuating means 17 is ensured in the interior of a device housing 24, which surrounds the brake means 27, the pawl clamp part 14, the adjacent end part of the guide part 7 together with the portion, projecting from it, of the support part 8 and the portion, facing the pawl clamp part 14, of the actuating means 17. In figures 3 through 6 one of the two halves of the device housing 24 has been removed in order to make clear the parts comprised in it. At one or both side walls of the device housing 24 there are guide grooves 25, into which a guide part 26 of the actuating element 21 fits.

[00028] The spring means 19 has the actuating rod 20 extending through it and bears against the device housing 24 and also the actuating element 21.

[00029] The brake means 27 is preferably a friction brake and in the working example possesses two brake bodies 28 and 29 which are opposite to each other in relation to the support part 8, such bodies being movably supported in a recess 30, respectively extending through the guide part 7 from the outside as far as the support part 8, of the guide part 7. On actuation of the actuating means 17 same not only engages the pawl clamp part 14 but also thrust the brake bodies 28 and 29 against the support part 8 so that there is a frictional force at the latter. The brake bodies 28 and 29 may for example consist of a rubber-like frictional material or the like. It will be evident that only one brake body 28 or 29 would be sufficient or that more than two brake bodies could be provided.

[00030] In principle the brake bodies 28 and 29 could admittedly be directly worked by the actuating means 17. However it is preferable for the actuating means 17 to be operated by way of roller bodies 31 on the brake bodies 28 and 29, such roller bodies also being bearinged in the respective recess 30 and protruding somewhat from it.

[00031] The actuating element 21 fits around the guide part 7 with a play permitting the actuating movement of the actuating means. It is for example in the form of a frame 35 surrounding the guide part 7. For the operation of the two brake bodies 28 and 29 the actuating element 21 possesses rib parts 32 and 33 extending past the sides of each brake body 28 and 29, and on the rib parts in each case a ramp face arrangement 34, acting on the roller bodies 31, is formed. If the actuating rod 20 is shifted and with it the actuating element 21 during an actuation stroke 39 (to the left in the drawing), the ramp faces 37 simultaneously reach the roller bodies 31 and then later the actuating face 38 of the two ramp

face arrangements 34 reach them so that same are thrust inward toward the support part 8. The ramp faces 37 extending at a slant to each other in the direction of the actuating path then essentially perform the stroke necessary for thrusting the ramp faces 37 inward. The actuating faces 38 which are essentially parallel to each other and in the working example are also parallel to the guide part 7, hold the roller bodies 31 thrust inward with an essentially constant thrust force. While the actuating faces 38 are in engagement with the roller bodies 31 the thrust on the brake bodies 28 and 29 is constant essentially independently of the level of the actuating stroke 39.

[00032] When the actuating means 17 is not operated the ramp face arrangements 34 are arranged at a distance from the roller bodies 31 so that they are not loaded and accordingly the brake bodies 28 and 29 do not press inward.

[00033] The roller bodies 31 roll on the ramp face arrangements 34. The roller bodies 31 preferably have anti-frictional surfaces.

[00034] The braking action of the brake bodies 28 and 29 depends on, inter alia, the respective thrust pressure with which they are forced against the support part 8. The thrust force can vary, for example owing to manufacturing inaccuracies in the case of the support part 8 or in the case of the brake bodies 28 and 29 or the like. Furthermore the braking action of the brake means 27 may be too low in the case of a heavy workboard 2 and/or owing to objects lying on the workboard 2. Accordingly the braking action of the brake means 27 is able to be adjusted in accordance with the invention by means of an adjustment means 40. The adjustment means 40, which is illustrated in detail in figure 2, and more generally in figures 3 through 6, diagrammatically, comprises

for example a screw arrangement 41 using which the distance apart of the rib parts 32 and 33 may be set. Accordingly the thrust force, which is exerted by the rib parts 32 and 33 on the brake bodies 28 and 29, and accordingly also of the braking action of the brake means 27, is adjustable.

[00035] A screw 42 of the screw arrangement 41 extends through passage openings 43 on the free ends, remote from the actuating rod 20, of the rib parts 32 and 33. On the screw 42 a nut 44 is screwed. The nut 44 is preferably at least partially ribbed for easier manual adjustment thereof. A head 45 of the screw 42 bears in a manner preventing rotation against an abutment 46 at the free end of the rib part 32. By tightening or loosening the nut 44 the distance apart of the rib parts 32 and 33 may be adjusted and accordingly the braking action of the brake means 27.

[00036] In the device housing 24 an opening, not illustrated in the drawings, may be provided, through which the nut 44 extends to the outside where it may be turned. This opening may for example be a slot, which for example is provided instead of the front portion of the guide groove 25.

[00037] Owing to the connection with the screw arrangement 41 the actuating element 21 forms a sort of frame 35. In principle however no surrounding frame must be present. The rib parts 32 and 33 could for example also constitute arms of a U-shaped bridge.

[00038] Failing a screw arrangement 41 the distance apart of the rib parts could, for adjustment of the brake effect of the brake means 27, be for example also changed by alteration of the distance apart of the guide grooves 25. For this purpose for instance the halves of the device housing 24 could be mounted with a larger or smaller relative distance apart.

[00039] The clamping of the support part 8 with the pawl clamp part 14 is as follows: the pawl clamp part 14, preferably manufactured of sheet metal, is seated on the top end side 18 of the guide part 7, at which the support part 8 emerges, and has the support part 8 extending through it at a passage opening 15. The passage opening 15 is in cross section somewhat larger than the support part 8 so that the pawl clamp part 14 may is seated on the support part 8 with a freedom to run skew and be tilted to and fro through certain pivot angle. On pushing the support part 8 into the guide part 7 the support part however tilt-locks the support part 8 in the passage opening 15 in the pawl clamp part 14 which then bears against a point 16 on the guide part 7 and is pivoted downward around the point 16 of engagement so that orientated obliquely in relation to the longitudinal direction of the telescoping arrangement 7 and 8. Accordingly the support part 8 and, via it, the workboard 2 is held at the respective level.

[00040] The end side 18 is made oblique from the support point 16 toward the actuating means 17, i. e. away from the end 10, supporting the workboard 2, of the support part 8 so that as seen in a side elevation there is a wedge-like intermediate spaces between the pawl clamp part 14 and the end side 18 of the guide part. The pawl clamp part 14 bears on one side of the support part 8 at 16 against the guide part 7. The actuating means 17 engages the pawl clamp part 14 on the other side of the support part 14.

[00041] In order to be able to shift the support part 8 and accordingly alter the slant of the workboard 2 the skew setting between the pawl clamping part 14 and the support part 8 must be overcome. This is performed automatically if the support part 8 is pulled out of the guide part 7 on upwardly pivoting the workboard 2. Even with a small entrainment of

the pawl clamping part 14 in the retraction direction, when it is pivoted about the support point 16 upward, the projection of the passage opening 15 as seen in the longitudinal direction of the support part 8 will be so large that the support part 8 can be shifted practically free of hindrance. If the support part 8, on the contrary, is to be pushed into the guide part 7, the skew setting is overcome by the user operating the actuating means 17, with which the pawl clamping part 14 is tilted about the support point 16. In this case the actuating element 21, which was so far ineffective with the actuating rod 20 not in action, engages the pawl clamping part 14 and rocks same to override the skew setting.

[00042] Using the actuating means 17 it is possible for the pawl clamping part 14 to be shifted clear by movement away from the guide part 7. In the working embodiment the actuating rod 20 must be drawn away from the pawl clamping part 14 so that the skew setting is overcome. The linear motion of the actuating rod 20 is converted into a pivotal movement of the actuating means 14 with the aid of an actuating part 36 of the actuating element 21 having, for example, a ramp face 22. The ramp face 22 fits under an oblique slanting part 23 of the pawl clamping part 14. The ramp face 22 and the oblique part 23 extend obliquely slanting in relation to the longitudinal direction of the actuating rod 20. The ramp face 22 engages the 3part 22 on pulling on the actuating rod 20 and tilts the pawl clamping part 14. Accordingly the skew setting in relation to the support part 8 is discontinued.

[00043] In lieu of a linear shifting actuating rod operation could also be with the aid of a pivoting lever or the like. Moreover, a bowden cable could for example be employed instead of the actuating rod.

[00044] For arresting the support part 8 other arresting means could serve as the pawl clamping part 14. Instead of the pawl clamping part 14 a pin or stud, able slide in relation to the guide part 7, could be used, which fits into recesses or openings in the support part 8.

[00045] It will be clear that for adjustment of the braking action of the brake means 27 a stepped ramp face arrangement could be provided having a plurality of steps. The steps could for instance have pairs of essentially mutually parallel actuating faces similar to the actuating faces 38, the distance between the respective actuating faces from one pair thereof to another pair thereof becoming smaller and smaller during an actuating stroke. The transition from one pair of actuating faces to the next one could be in a form similar to the ramp faces 37.